

The ICT Sector Status Report

The ICT Sector Status Report presents the status of ICT¹ sector in SEE² region. This document provides a review and analysis of existing policies and strategies impacting the ICT sector. It also provides an analysis of major Information Society development pillars individually for Albania, Bosnia and Herzegovina, Croatia, FYR Macedonia³, Moldova, Serbia and Montenegro (Kosovo, Montenegro and Serbia).

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<u>Regional Coordinator:</u>	Zlatan Šabić	
<u>Authors:</u>	Albania:	Yevgeny Korneev,
	Bosnia and Herzegovina:	Zlatan Šabić,
	Croatia:	Mladen Mauher,
	FRY Macedonia:	Zoran Janevski,
	Moldova:	Victor Besliu,
	Serbia and Montenegro:	Marijana Vidas Bubanja, Ružica Mišković, Besim Ilazi.
<u>Contributor:</u>	INA SouthEastern Europe Telecommunications & Informatics Research Institute	
<u>Editors:</u>	Tarik Zaimović, Nera Nazečić	
<u>UNV Coordinating role:</u>	Ad de Raad, Nicola Tiezzi, Fatima Smajlović	
<u>Proofreading:</u>	Douglas Van Wieren	

The views expressed herein are those of the authors and do not necessarily reflect the views of United Nations Development Programme, The Stability Pact for SEE or eSEEurope Initiative

¹ ICT - Information and Communication Technologies
² SEE – South-East Europe
³ FYR Macedonia – Former Yugoslav Republic Macedonia

Final Version Review: Moises Venancio (UNDP BiH), Yuri Misnikov (UNDP RBEC), Bernard Snoy (Stability Pact), Richard Harris (European Commission/DG IS), Pantelis Angelidis (INA), Mario Apostolov (UNECE), Stuart Kerr (CLDP), Miklos Havass (Hungary), Dusan Caf (Slovenia)

eSEE Chairperson: Marijana Vidas Bujanja

Stability Pact Expert: Jani Bogoevski

Head of eSEEurope Secretariat: Nera Nazečić

eSEE e-Envoys and Appointed Senior Policy Officials:

Albania: Dhurata Kurti

Bosnia and Herzegovina: Slavko Marić

Branimir Mandić

Croatia: Dijana Šimić

Macedonia: Ljuben Talev

Elica Percinkova

Moldova: Sergiu Sytnic

Nicolae Cristea

Serbia and Montenegro/ Serbia: Branislav Anđelić

Serbia and Montenegro/ Montenegro: Ružica Mišković

Serbia and Montenegro/ Kosovo: Agim Kukaj

Louise Carvalho (UNMIK)

UNDP-UNV: Luna.Abu-Swaireh, Thuan Nguyen, Ad de Raad, Jens Toyberg- Frandzen, Moises Venancio, Tarik Zaimović, Nicola Tiezzi, Fatima Smajlović, Anna-Kristina Stjamerklint, Chiara Pace, Cornelis Klein, Nataša Matijašević, Christine Roth, Conor Lyons, Francis M. O'Donnell, Nenad Rava, Aleksandar Jovanović, Garret Tankosić- Kelly, Mirsad Bibović, Frode Muring, Matilda Dimovska, Zoran Veličkov, Suzana Ahmeti, Bruno Pouezat, Irene Stavenski, Victor Cosuleanu

Interviewers/ NUNVs / Interns: Valentina Pellizer, Enik Pogace, Stefania di Paola, Manja Huzbašić, Noemi Cerecedo, Ivana Ivičić, Robert Babić, Aferdita Dragaj, Zoran Savić, Siniša Trkulja, Kristina Kuzman, Vanja Grgurović, Ana Pejčinova, Emilija Bumbarovska, Vitalie Vremis, Galina Tcaci

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Abbreviations and acronyms

AMNET	Academy of Sciences of Moldova Network	GPS	General Population Survey (SIBIS)
ANRTI	National Agency for Regulations in Telecommunications and Informatics, Moldova	GSM	Global System for Mobile Communications
BiH	Bosnia and Herzegovina	GTZ	German Technical Cooperation
BIHARNET	BiH Academic and Research NETWORK	HBS	Household Budget Survey
BPK	Banking and Payments Authority of Kosovo	HIS	Health Information System
CARNet	Croatian Academic and Research Network	ICS	Inter-banking Clearing System
CIDA	Canadian International Development Agency	ICT	Information and Communications Technologies
CCNA	Cisco Certified Networking Associate	ICT4D	Information and Communications Technologies for Development
CFA	Central Fiscal Authority	INSTAT	Institute of Statistics, Albania
CGEY	CapGemini	IS	Information Society
CIDA	Canadian International Development Agency	ISP	Internet Service Provider
CIT	Commission for Information Technology, FYR Macedonia	IMF	International Monetary Fund
CoM	Council of Ministers, Bosnia and Herzegovina	IMG	International Management Group
CRA	Communications Regulatory Agency, Bosnia and Herzegovina	INIMA	Institute of Informatics and Applied Mathematics, Albania
DANTE	Delivery of Advanced Network Technology to Europe	ITIA	Information Technology and Internet Agency, Serbia and Montenegro
DES	Department of Education and Science Kosovo	ISDN	Integrated Services Digital Network
DIT	Department of Information Technology	KCB	Kosovo Consolidated Budget
DMS	Decision Maker Survey (SIBIS)	KEC	Kosova Education Center
DSL	Digital Subscribers Line	KEDP	Kosovo Educator Development Project
EAR	European Agency for Reconstruction	KEK	Korporata Energjetike e Kosovës (The Power Company of Kosovo)
EC	European Commission	KIPA	Kosova Institute for Public Administration
ECDL	European Computer Driving License	KFOR	Kosovo Force
EU	European Union	KFOS	Kosovo Foundation for Open Society
Eurostat	Statistical Office of the European Communities	KTA	Kosovo Trust Agency
eSEE	electronic South-Eastern Europe	KTTN	Kosovo Terrestrial Transmission Network
eSEE Agenda	eSEE Agenda for Development of Information Society	LAN	Local Area Network
eSEE WG	eSEE Working Group	MIS	Management Information Systems
EMIS	Education Management Information System	MFE	Ministry of Finance and Economy
FBiH	Federation of Bosnia and Herzegovina, one of two entities in BiH	MAFRD	Ministry of Agriculture, Forestry and Rural Development
FINA	National Finance Agency, Croatia	MAN	Metropolitan Area Network
FOSI-M	Foundation Open Society Institute Macedonia	MASIT	Macedonian Association for Information Technology
FMO	Frequency Management Office	MEST	Ministry of Education Science and Technology
FYROM	Former Yugoslav Republic of Macedonia	MLSW	Ministry of Labor and Social Welfare
GDP	Gross Domestic Product	MTI	Ministry of Trade and Industry

MOU	Memorandum of Understanding	SIBIS	Statistical Indicators Benchmarking the Information Society
MOUS	Microsoft Office User Specialist	SIOL	Slovenia On-line (ISP)
MPC	Ministry of Public Services	SME	Small and Medium-sized Enterprises
MTC	Ministry of Transport and Communications	SOE	Socially owned Enterprises
MW	Microwave	SOK	Statistical Office of Kosovo
NACE	Statistical classification of economic sectors in the EU	SRCE	University Computing Centre, Zagreb, Croatia
NAICS	North American Industry Classification System	SRSJ	Special Representative of the UN Secretary General
NATO	North Atlantic Treaty Organization	TANJUG	National Information Agency, Serbia and Montenegro
NGO	Non Governmental Organization	TCK	Telemedicine Centre of Kosova
NREN	National Research & Education Network	TERENA	Trans-European Research and Educational Networking Association
NSI	National Statistical Institutes	TFMC	Theatre Frequency Management Cell
OECD	Organisation for Economic Co-operation and Development	ToR	Terms of Reference
OSCE	Organisation for Security and Cooperation in Europe	TRA	Telecommunications Regulatory Authority
PCP	Primary Care Physician	TSS	Transitional Support Strategy
PDH	Plesiochronous Digital Hierarchy	UMTS	Universal Mobile Telecommunications System
PIAP	Public Internet Access Point	UN	United Nations
PISG	Provisional Institutions of Self-Government	UNDP	United Nations Development Programme
POE	Publicly owned Enterprises	UNV	United Nations Volunteers
POP	Points of Presence	UNMIK	United Nations Mission in Kosovo
PTK	Post and Telecommunications of Kosovo	UNICEF	United Nations Children Fund
R&D	Research and Development	USAID	United States Agency for International Development
RS	Republika Srpska, one of two entities in BiH	VC	Video Conferencing
QoS	Quality of Service	VAT	Value Added Tax
SCG	Serbia and Montenegro (Srbija i Crna Gora)	VET	Vocational Education and Training
SDH	Synchronous Digital Hierarchy	WAN	Wide Area Network
SEE	South-Eastern Europe	WSIS	World Summit on the Information Society
SEECF	South East Europe Cooperation Process	WUS	World University Service Austria
SEEREN	South East European Research and Education Network		

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EXECUTIVE SUMMARY

This report presents the status of ICT sector in South-East Europe (SEE) region (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Serbia and Montenegro - Kosovo, Montenegro and Serbia). It is aimed to provide the support to the policy and decision makers for Information Society related national policies and strategies.

The ICT Sector Regional Status Report provides a review and analysis of existing policies and strategies impacting the ICT sector. It also provides an in-depth analysis of major Information Society development pillars:

- Legislation, Policy and Regulatory Environment
- ICT Infrastructure and Services
- E-Governance
- ICT for Business and e-Business
- E-Education
- E-Health
- ICT Industry

At the very beginning, the report presents the major issues related to ICT policies and strategies development, as well as the main legislative regulation, which is a framework of all ICT related activities. In that respect, countries have mostly developed basic strategic papers and an increasing number of related laws and regulations are being formulated. It can be expected that all the important legislation will be adopted within next one or two years. The liberalization of the telecommunication sector has not been completed yet, but it is the trend.

However, infrastructure is insufficient to provide the acceptable penetration rates and cheap usage of the modern and broadband communication technologies. Nevertheless, Internet services that are not liberalized completely are offered in different ways– with the exception of Croatia which has an Internet penetration of about 30%, all other SEE countries currently have an Internet penetration of less than 15%.

This problem is not only related to the infrastructure, but it is also connected with the poor economic power of citizens and business.

The question arises whether the small number of on-line users is the reason for the poor offer of electronic solutions as e-Commerce, G2C, G2B, e-education, e-health and others, or the benefit of these solutions with this kind of Internet penetration would be insignificant. However, the lack of functional electronic signature usage due to the legally incomplete area is making the situation even harder.

Still, even in this situation, SEE countries represent an ICT market with high potential. The companies offering IT services are constantly improving their services, promotion and appearance on domestic and larger markets abroad.

Slowly but steadily, ICT sector is making itself a significant factor in the improvement of competitiveness and growth in each of SEE countries.

1. INTRODUCTION

1.1. THE ICT SECTOR STATUS REPORT

The eSEEurope is a regional initiative founded by the Special Coordinator of the Stability Pact for South Eastern Europe and supported by UNDP. The main aim of eSEEurope is to better integrate SEE countries into the global, knowledge-based economy by regionally supporting the development of information society.

The eSEE Initiative was launched in Istanbul in October 2000 and constituted in January 2001 with Sweden as Chair, and Croatia followed by Macedonia as co-Chair. In effort to reinforce regional ownership and to inject the Initiative with new momentum, the Chairmanship was transferred to FR Yugoslavia, while eSEE Secretariat is being officially hosted in Sarajevo by UNDP Country Office BiH since February 2002.

On October 29, 2002, the member countries of the Stability Pact for SEE: Albania, Bosnia and Herzegovina, Croatia, FYR Macedonia, Moldova, Serbia and Montenegro, signed a basic document for IT development activities in their region. In order to address the challenges of Information Society development, the international agreement "eSEEurope Agenda for the Development of the Information Society" (eSEE Agenda) was accepted at the Telecommunications for Development conference in Belgrade.

Within the framework of eSEE Agenda, the member countries accepted the obligation to develop and implement national ICT Strategies. As one of the important steps towards the implementation of eSEE Agenda, the ICT Sector Status Report had to be prepared. It gives an overall situation overview and provides support to the policy and decision makers for Information Society related national policies and strategies.

The ICT Sector Status Report is aimed to:

- Review and analyze the existing policies and strategies impacting the ICT Sector;
- Gather evidence of harnessing ICT for development and information society in the SEE region;
- Track progress in building the foundations for the information society;
- Identify, collect and codify know-how available in the South Eastern Europe in the area of ICT for Development and Information Society.

The ICT Sector Status Report has been prepared on the basis of 8 reports, which present the status of ICT sector in each of the eSEE Initiative member countries (there are 6 countries, but 3 separated reports have been prepared for Serbia and Montenegro– for Kosovo, Montenegro and Serbia).

The ICT Sector Status Report provides an in-depth analysis of major Information Society Development Pillars including the description of ICT Sector related projects. In addition, the report can serve as the basis for a more detailed analysis of individual ICT sectors. In this context, it also suggests relevant set of indicators for benchmarking the status of information society development.

The most recent data source for this Report was field research conducted from March through May , 2004 and implemented as a joint project of the eSEEurope Secretariat, United Nations Volunteers and United Nations Development Program in Bosnia and Herzegovina.

UNV supported the research process through 13 National UN Volunteers who acted as National Project Focal Points for assessment in each respective geographic area. NUNV's work was supported by groups of interviewers of OneWorld, SEEYN and external polltakers and by a National Consultant who compiled the ICT report for each respective country/area.

The aim behind the research was to identify the specific information and to gain insight into the pressing needs with regards to key ICT related policies, projects and programs in government and public institutions, international organizations, education domain, business sector and civil society.

1368 respondents from Albania, BiH, Croatia, FYROM, Moldova, Serbia and Montenegro including Kosovo were interviewed. Drawing on clear and detailed recommendations, targeted institutions were selected locally in cooperation with UNDP Focal Points, NUNVs, National Consultants and editors of the

OneWorld SEE and expert network. The list was chosen to represent the most indicative institutions and firms, while making a proportionate coverage ratio of the cities and in-country areas, wherever possible. The research process was conducted by combining methods of face-to-face and telephone interviews, postal and e-mail correspondence.

In the process of Country Report creation, various supplementary data sources have been used by National Consultants, including the existing assessments, reports, publications and official institutional sources.

Additional important data source was "Communication Infrastructure Assessment – eSEE Countries" prepared by INA SouthEastern Europe Telecommunications & Informatics Research Institute from Greece. That report provides an excellent overview of the telecommunication infrastructure and related regulatory environment within the SEE region. The authors appreciate the support provided by INA.

The authors are also grateful for data sources provided by UNDP Country Offices; especially information collected for eReadiness Assessment reports prepared as a pioneering work in the field during 2002 and 2003.

The opinions expressed and arguments used in this report are the sole responsibility of the authors and do not necessarily reflect those of the respective governments, UNDP or eSEE Initiative.

1.2. PREPARATION PROCESS

A. The list of the activities over the period December 2003 - May 2004

A.1. The preparatory phase: December 1st –March 20th 2004

- December 2003 to January 31 2004:
 - Circulation of an official proposal with project description of the UNV-UNDP Regional Project, and other supportive documentation to the UNDP COs/Field Offices in each targeted country/area within SEE (*December 8th 2003*)
 - Establishment of the work relationship with the ICT Focal Points in each UNDP CO
 - Commencement of preparations for the recruitment procedure of the NUNVs/Local Experts
- February 6th -March 6th 2004:
 - Official visits aimed at presenting the project details, dynamics and strategy combined with an interviewing process of the most suitable candidates for NUNV and Local Expert positions. Visits were conducted by e-SEE Secretariat and UNV-UNDP Regional Project Operations Manager as per following schedule: Albania: January 15-18 2004; Serbia & FYROM: February 5- 6 2004; Montenegro & Croatia: 11- 12 February 2004; Moldova: March 4-6 2004;
- March 7th- March 20th 2004:
 - 2 day preparatory meeting: An Exchange of Existing Practices and Workshop on the ICT Sector Status Report (March 11&12th 2004) in Sarajevo, BiH aiming at:
 - Recapitulation of the common understanding of the objectives and expected results of the ICT Sector Status Report among all parties;
 - Underling the roles of the UNDP CO partners, including UNDP Focal Points, National UNVs/Experts, National Consultants and One World editors;
 - Differentiation of the two major outputs of the ICT Sector Status Report;
 - Presentation of the specific project fiches:
 - ICT Sector Status Report Questionnaires/Discussion Guides;
 - Environmental scanning;
 - Interviews and data collection;
 - Review and analysis of collected data;

- Creation of Country Reports;
- Fashioning of the ICT Sector Status Report;
- Stressing the importance of harmonizing dynamics of the parallel processes in participating countries - regional team building;
- Distribution of the questionnaires for the Government, Education, Business, International and Civil Society Sector and data entry applications to the UNDP offices (March 19th 2004);
- A preliminary research on the ICT status in all targeted countries/areas including web resources, recent surveys, and similar projects, locating target groups and preparation of directories with contact information of institutions;
- Translation of the questionnaires from English to local languages and preparation of the supplementary documents. Supplementary documents include official letter by each UNDP Resident Representative and memo with detailed instructions and project related information;
- Pilot phase: testing the time needed for performing a single interview and examining the wide ranging spectrum of responses
- Establishing methodology adjusted to the specifics of each UNDP office: based on the pilot phase

A.2. Survey Process: Data Collection, Data Entry: March 20th– May 9th 2004

The following table represents the research results in Albania, BiH, Croatia, FYROM, Moldova, Serbia and Montenegro including Kosovo (March 20th –May 9th 2004)

Type of targeted Sectors	Number of reached respondents in each targeted country/area							
	Albania	BiH	Croatia	FYROM	Serbia	Montenegro	Kosovo	Moldova
GOVERNMENT	8	30	31	24	32	13	26	8
CIVIL SOCIETY	40	32	67	11	71	5	66	71
EDUCATIONAL	4	29	36	19	21	11	14	16
BUSINESS	20	69	100	51	73	49	61	101
INTERNATIONAL	28	36	28	22	8	18	14	4
TOTAL	100	196	262	128	205	96	181	200
GRAND TOTAL	1368							

Challenges: (i) Tight deadlines; (ii) Easter holidays, other unexpected circumstances such as two rounds of presidential elections in Macedonia, due to which many NGOs involved in the election process as observers were not available to take part in ICT Sector Status Report survey; (iii) Virus flood in the query period, servers breaking down, exchanged messages with attachments automatically being deleted, case with almost all UNDP offices; (iv) Inaccessibility of decision-makers; (v) Unwillingness of institutions to cooperate: there were a couple of cases of open refusal to cooperate with the UNDP by private companies. Delays were experienced in questionnaire submission; (vi) Security status: the managerial boards of several banks decided not to answer the questionnaire for, what they rated as, information security reasons.

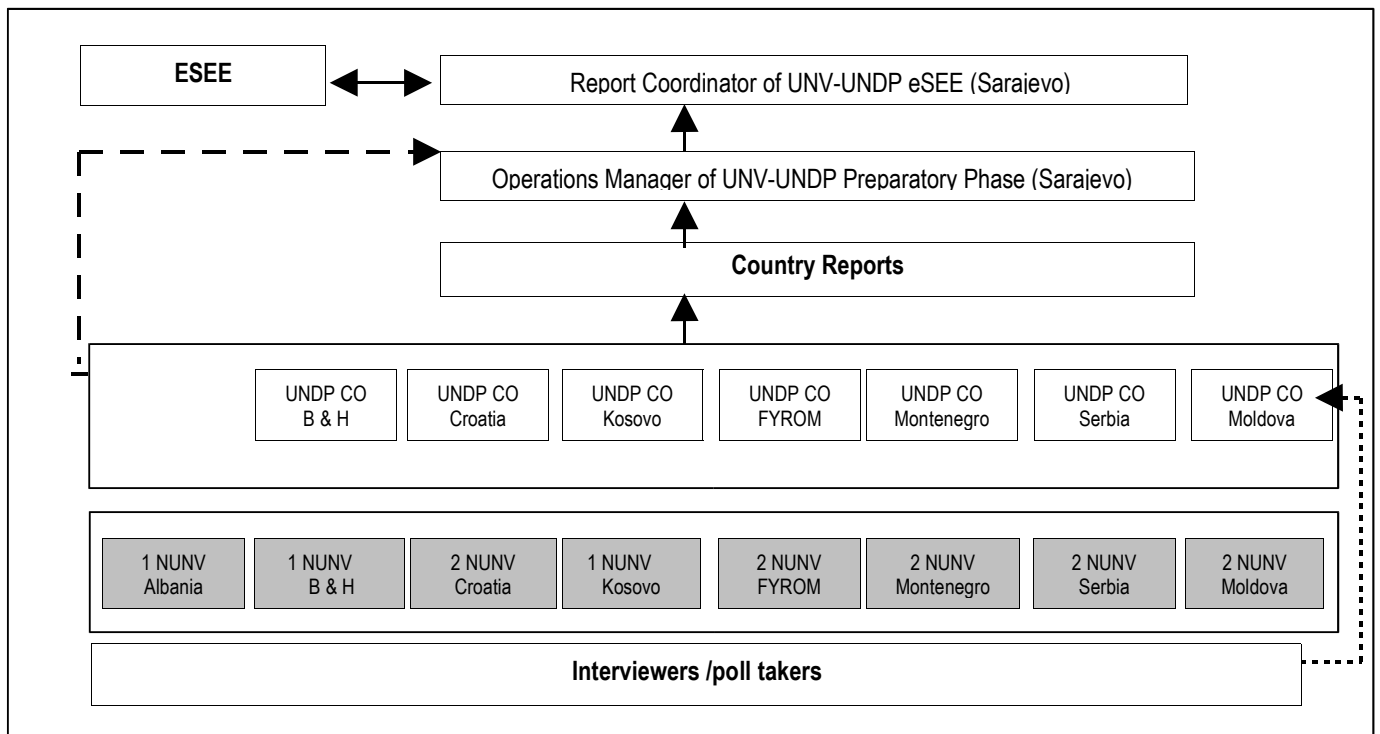
B. ICT SSR Project Team

B.1. The Team Members:

- The Head of the e-SEEurope Secretariat

- The Report Coordinator of the ICT Sector Status Report
- Operations Manager of the UNV-UNDP Regional Project
- National Consultants (one per each respective country/area)
- UNDP Focal Points (one per each respective country/area)
- National UNVs/Local Experts (one and/or two per each respective country/area)
- Poll-takers

B.2. Organigramme of the eSEEurope ICT Status report implementation structure



2. REGIONAL PERSPECTIVE

2.1. ICT/IS POLICIES AND STRATEGIES

To address the challenges of Information Society development, the member countries of the Stability Pact for South Eastern Europe (Albania, Bosnia and Herzegovina, Croatia, FYR Macedonia, Moldova, Serbia and Montenegro) formally associated themselves with European IT development process defined in the eEurope and eEurope+ Action plans. On October 29, 2002, at the Telecommunications for Development conference in Belgrade, SEE countries signed and accepted international agreement "eSEEurope Agenda for the Development of the Information Society" (eSEE Agenda) as a basic document for IT development activities in their region. This agreement is in line with eEurope 2002 and 2005 Action Plans and eEurope+ plan of candidate countries and represents the confirmation of SEE countries' commitment to develop information societies in their economies in accordance with European models and standards. This document is also endorsed by member countries at the March 2003 South East Europe Cooperation Process (SEEC) Summit.

Within the framework of eSEE Agenda, the member countries accepted the obligation to develop and implement national ICT Strategies. Status of development and/or implementation of national ICT/IS Policies and Strategies are shortly presented in the following table:

Country/ Region	Status	Implementation
Albania	A National Strategy for Development of ICT accepted by Government at the beginning of 2003.	Implementation is lagging back due to lack of necessary attention by Government. The lack of appropriate legislation is main obstacle.
Bosnia and Herzegovina	Policy, Strategy and Action Plan for information society development prepared by Ministry of Transport and Communications and UNDP. Formal acceptance by Council of Ministers expected before the end of 2004.	Although Policy and Strategy still not formally accepted, there are important state level initiatives, programs and projects related to IS development.
Croatia	Strategy of Development of the Republic of Croatia – "Croatia in the 21st Century" prepared in 2000.	Having created strong environmental conditions for e-developments (legislative, policy, regulations), strong developments of ICT infrastructure and services, creating the climate for decreasing of digital divide, fostering the e-government developments, developing open and competitive economy, Croatia is decreasing the gap on the way to eEurope.
Macedonia	Official National ICT Strategy not formally developed and accepted, but there is strategic document adopted by government in 2002: "e-Declaration 2002".	Recommendations for faster development of an information society and digital economy in Macedonia still not well implemented.
Moldova	IS Building National Strategy planned for development by late 2004.	On March 19, 2004, the President of Moldova issued a Decree that declared the IS as a national priority. However, still no major implementation results visible.
SCG - Kosovo	Policy and Strategy not formally developed and accepted.	Several initiatives, mostly dependent upon involvement of international organizations and agencies.
SCG - Montenegro	Strategy and Action Plan of Information Society prepared, acceptance expected during 2004.	Strategy still not formally accepted, but there are governmental bodies and some initiatives related to IS development.

SCG - Serbia	Policy has been completed and published for comment. Strategy is being developed, and its finalization awaits adoption of the policy.	The most of the activities defined by eSEE Agenda are under development or have been implemented.
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2.2. LEGISLATION, POLICY AND REGULATORY ENVIRONMENT

The overall situation in the region can be described as “transitional”. All country legal systems are introducing new laws and regulations, and the overall environment is becoming increasingly appropriate for Information Society development.

The status regarding major laws, regulations, coordination and regulatory bodies is presented in the following table.

Relevant Laws and Regulations; Institutional infrastructure	Albania	BiH	Croatia	Macedonia	Moldova	SCG Kosovo	SCG Montenegro	SCG Serbia
Law on Telecommunications	+	+	+	+	+	+	+	+
Protection of personal data	+	+	+	+	+ ⁽⁴⁾	-	-	+
Protection of consumers	-	+	+	-	-	-	-	+
Copyright and similar rights	+	+	+	+	-	-	-	+
Access to information	+	+	+	+/- ⁽⁵⁾	+	-	-	+
Electronic signature	-	+/- ⁽⁶⁾	+	+	+/- ⁽⁷⁾	-	+	+/- ⁽⁸⁾
Electronic commerce/business	-	-	+	-	+/- ⁽⁹⁾	-	-	-
Amended Criminal Code	-	-	+/- ⁽¹⁰⁾	+	?	-	-	+
Independent regulatory body of telecommunications	+	+	+	+/- ⁽¹¹⁾	+	+/- ⁽¹²⁾	+	+/- ⁽¹³⁾
Government structure(s) dedicated to IS development	-	-	+	-	+	-	-	+

Legend: + Already passed/introduced/active
+/- Exists, but not effective; Preparation process is underway
- Not established/passed/introduced; still no major activities
? Unknown

NOTE: Not all policies, laws, regulations or organizations can be treated the same way since different countries have different context. More details can be found in chapter: "In-Depth Description of ICT Environment".

4 Included in Law on access to information

5 Draft - Expected to be adopted

6 Only in one out of two entities in BiH (Republika Srpska), but not enforced

7 In Parliamentary procedure

8 Waiting to be ratified in the Parliament

9 In Parliamentary procedure

10 „Convention on Cyber crime”

11 Not independent; “Telecommunications Directorate” under the Ministry of Transport and Communications

12 Not independent; declared as independent, but organizationally the part of government

13 Introduced by Law on Telecommunications, but still not established

2.3. READINESS FOR INFORMATION SOCIETY

The term eReadiness is used here to denote the degree to which a given society, social group or organization is aware of, has adjusted to and is prepared to use the new information and communication technologies.

It is important to assess it in terms of defining and implementing of national development strategy. The aim is to develop awareness of the challenges and comparative advantages and deficits and to encourage development of the capacity to tackle them and to exploit the new possibilities.

There are different approaches to eReadiness assessment. Whichever approach the country adopts, it shall be implemented systematically and used consistently in time. That is the only way it can produce useful results.

This report shows that, with the exception of Croatia, actually none of the countries in the region has systematic and consistent process of eReadiness assessment¹⁴. There are neither governmental nor non-governmental institutions that are dedicated to long-term assessment of country's eReadiness.

Some existing external assessments also do not provide clear picture and do not cover the region well. For example, Global Information Technology Report¹⁵ that includes assessment for more than 100 countries covers only Croatia, Macedonia and Serbia. Also, the Economist's "2004 eReadiness rankings report"¹⁶ does not include any of the countries from SEE region - it is interesting that this global report does not include the SEE region at all.

The overall assessment is not very encouraging but it is hard to measure exact level of eReadiness in the region, especially changes and trends in last few years. Since the assessment of country's eReadiness is one of the most important inputs for ICT strategy formulation and implementation, it leads us to conclusion that SEE countries need to significantly improve their ability to assess their eReadiness status.

2.4. ICT INFRASTRUCTURE AND SERVICES

The basic ICT infrastructure that is considered here includes:

- Fixed telephony,
- Mobile telephony, and
- Internet access

It seems that the overall status of fixed telephony is relatively good within the region as a whole. The penetration is presented in the following table:

Country/Region	Penetration	Note
Albania	39.00%	Calculated per average household of 5 persons
BiH	>95.00%	Calculated per average household of 4 persons
Croatia	>95.00%	
Macedonia	>95.00%	
Moldova	69.2%	Calculated per average household of 4 persons
SCG/Kosovo	26.9%	
SCG/Montenegro	62.0%	
SCG/Serbia	>95.00%	

¹⁴ UNDP CO in BiH has done some preliminary work in respect to eReadiness Assessment
¹⁵ Global Information Technology Report, The World Economic Forum and INSEAD, 2002/03, and 2003/04
¹⁶ The 2004 eReadiness rankings, Economist Intelligence Unit and IBM, 2004.

However, the penetration is not the indicator of quality of services. Almost all fixed telephony operators are in monopoly situation, and the quality of services varies.

The mobile networks and Internet Service Providers are in expansion all over the region:

Country/Region	Mobile telephony operator(s)	ISP's
Albania	AMC	15 active ISP's
	Vodafone	
	"Eagle"	
BiH	GSM BiH	More than 40 ISP's
	MOBI's	
	Eronet ¹⁷	
Croatia	HTmobile	7 major ISP's
	VIPnet	
Macedonia	Mobimak	8 major ISP's
	Cosmofon	
Moldova	Moldcell	More than 70 ISP's
	VOXTEL	
SCG/Kosovo	VALA900	4 major providers
	Mobtel	
SCG/Montenegro	ProMonte	2 major ISP's
	Monet	
SCG/Serbia	Mobtel	More than 60 ISP's
	Mobilna Telefonija Srbije	

Each of the countries has more than one mobile telephony operator. That competitive situation has positively influenced the market, with the exception of Bosnia and Herzegovina that has three active operators, but territorially almost totally divided (which means that real competition is not present).

Typical situation is also: major, state owned telecom operators own or control major ISP's, which very often means that these ISP's have better position regarding the usage of infrastructure. That market is still not well developed, the prices are still relatively high, so very often that situation represents major obstacle to for making the Internet penetration much closer to its potential.

2.5. DIGITAL DIVIDES

Digital divide can be defined as "the gap between individuals, households, businesses and geographical areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies and to their use of the Internet for a wide variety of activities."¹⁸

There are various methodologies to address this issue, but whichever we adopt, the foundation for any serious analysis are reliable data. The first fact that this report shows is the chronic lack of reliable data within the region. Some countries have better situation for some relevant data sets, but each of the countries is experiencing the serious lack of even basic statistics. There is no systematic and institutionalized way of tracking the basic indicators for digital divides. One of the priorities for eSEE initiative shall be setting up such system(s).

However, there are some indicators that can give us, albeit probably not precise answers, but general overview of situation in the region. These indicators cover mostly the access issues, while the other important aspects, such as digital literacy, local content, and economic development, are not covered

¹⁷ Operating without the licence.

¹⁸ „Understanding the Digital Divide“ OECD, 2001.

well. There is almost no reliable data related to understanding clear divides in these aspects per population age, residence, and similar.

In general, the access to basic ICT is presented in the following table:

	TV Set		Satellite TV Receiver		Phone		Computer		Internet	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Albania	95.1%	85.8%	23.1%	23.5%	39.0%		2.7%	0.3%	n/a	n/a
BiH	97.0%	89.0%	19.0%	16.0%	91.0%	70.0%	10.0%	3.0%	11.0%	0.02%
Croatia	n/a	n/a	n/a	n/a	>95%		n/a	n/a	30,0%	8,9%
Macedonia	n/a	n/a	n/a	n/a	>95%		avg. 9.2%		avg. 6%	
Moldova	>95%		n/a	n/a	>95%	40.4%	n/a	n/a	n/a	n/a
SCG/Kosovo	>95%		n/a	n/a	26.9%		15.9%		3.0%	
SCG/Montenegro	n/a	n/a	n/a	n/a	62.0%		9.9%		15.0%	
SCG/Serbia	n/a	n/a	n/a	n/a	>95%		16.0%		14.0%	

As we can see, much of the data is missing. However, it is quite clear that access to computers and the Internet is not good, especially in rural areas (for countries that do not have data on urban/rural divide there is overall perception that rural areas are not well covered).

2.6. E-GOVERNANCE

In its simplest sense, Electronic Governance (e-Governance) refers to the use of information and communication technologies for the processes of government and public administration. The notion of e-Governance incorporates all those processes and structures by means of which ICT can be employed by government to enable:

- Administration of government (e-Administration) and delivery of services to the public (e-Services) -- these generically constitute Electronic Government (abbreviated e-Government).
- Informing, vote-enabling, representation-enabling, consulting and involving the citizenry in, among others, broad consensus making in society in matters pertinent to decision making in political, social and economic priorities in government. This constitutes Electronic Democracy (abbreviated e-Democracy);

Together, these two components ensure that a government obeys democratic norms and provides trusted services.

Having in mind this operational definition of e-Governance, the SEE region seems to be in relatively early stages of development. The status of typical governmental information systems and e-Governance systems implementation is given in the following table:

Typical governmental information systems and e-Governance Systems	Albania	BiH	Croatia	Macedonia	Moldova	SCG Kosovo	SCG Montenegro	SCG Serbia
Electronic Citizen Registry	NO	YES	YES	NO	NO	YES/NO ¹⁹	YES/NO ²⁰	NO
Public Expenditures (Treasury/Finance)	NO	YES	YES	NO	NO	NO	YES	NO
Taxation Authorities	NO	NO	YES	NO	NO	NO	YES/NO ²¹	NO
Customs Administration	NO	YES	YES	NO	NO	NO	YES/NO ²²	NO
Network/communication infrastructure, dedicated to e-Governance systems	NO	NO	YES/NO ²³	NO	YES? ²⁴	NO	NO	NO
Web sites of ministries/Web portals	SOME	SOME	SOME ²⁵	SOME	SOME	SOME	SOME	SOME
E-Governance systems at local level/portals for citizens²⁶	NO	NO	NO	NO	NO	NO	NO	NO
E-Democracy systems	NO	NO	NO	NO	NO	NO	NO	NO
Judicial systems	NO	NO	SOME ²⁷	NO	NO	NO	YES	NO
Electronic Registration of Companies	NO	NO	NO	NO	NO	NO	NO	YES/NO ²⁸

¹⁹ needs to be fully implemented

²⁰ the old system operational, but needs to be fully replaced

²¹ implementation in progress

²² first phase implemented

²³ implementation at early stages

²⁴ government structures "well equipped and networked" – however, status of infrastructure not clear

²⁵ Web portals relatively well developed in comparison to other countries in the region, but not well connected to back-end systems

²⁶ Just few municipalities have implemented some elements of eGovernment systems in BiH, Croatia, Macedonia

²⁷ Commercial Court Register exists

²⁸ implementation in progress

In addition to these typical systems, there are some additional systems that are fully or partially implemented, such as:

- National Multifunctional Smart Card – in Croatia, implementation to be launched
- Registry of government owned Properties – in Croatia
- Intranet Payroll System – in Croatia, pilot project in progress
- Set of Financial Registers – in Croatia (FINA)
- Internet based Municipal document management system – in SCG - Kosovo
- HRM in the Civil Service – in SCG - Serbia, implementation in progress

The overview of state level e-Governance services shows that Citizen Registry and systems supporting important state financial transaction (treasury, customs, and taxation) are priority. Experiences of countries that have already implemented such systems (for example, Croatia and partially BiH) are very positive. These systems, especially the Citizen Registry, are fundamental for any other development.

The serious lack of electronic services for citizens on local level is also obvious. It seems that no country has serious state-level initiative or project for development of local level electronic services (back-end systems and web portals). That is to be also one of the highest priorities.

It is clear that all countries are almost totally lacking e-Democracy systems. This seems to be mostly the consequence of general status of democratic reforms - transparency and increased participative role of citizens seems not to be the priority to governments.

2.7. ICT FOR BUSINESS AND E-BUSINESS

Since the usage of ICT in business and e-business (extensive use of ICT as the key enabler of business), cannot be regarded as an isolated phenomenon, but rather as an expression of the wider process of digitalization of the economy as a whole, the overall status within the region can be denoted as non-developed.

In comparison to developed western countries, the first significant difference is the lack of cyber space market. Potential customers are mostly not present on the Internet. In such environment, the Internet/Intranet technologies are mostly used for data retrieval and communication (internal and business-to-business). There are many companies having Internet based presentation and marketing, but very few providing services such as selling or other kinds of business-to-customer E-commerce models.

However, many good ideas and solutions are trying to survive. It means that primary issue is not the potential of e-business and the will of the business to explore it, but the issue of e-business enablers:

Telecom operators/ISPs

Most of them have monopolistic behavior and considerably high price of services. Services have long delivery time and relatively low quality. Huge, state owned telecoms often favor own ISPs. Such behavior slows down the spread of secondary ISPs network. It means that Internet penetration is significantly reduced, and that is the major obstacle for business to spread in cyber space.

Even though the most of the countries have well-developed basic infrastructure, there are different examples, such as Kosovo.

Postal operators

Any e-based business depends heavily on reliable postal services. Most of the countries have postal services that are not trusted for valuable shipments and no payment-on-delivery services are available.

Financial infrastructure

All of the countries within the region have mainly cash-based society (that can be said even for Croatia who has the most developed financial infrastructure). For example, in the first half of 2003, only 8.8 % of bank transactions in Moldova were non-cash, and the rest being operations of cash withdrawal. The e-business cannot develop without basic e-banking services – they are not available to satisfactory level. Good examples of Internet/electronic payments are under development.

However, it seems that banking sector is the most developed one in almost all countries. All of the banks use ICT for doing business, but it does not mean that sophisticated systems are in place. Albania is a good example. Only two banks in Albania do not have Internet access, while 48% of Albanian banks have Internet based systems. However, Internet-based bank transactions are implemented only by one bank. It means that banks are computerized, but do not offer e-banking services. Similar example is Bosnia and Herzegovina. All banks are computerized, but only several banks offer credit cards and have ATMs, and only one bank has some real e-banking services related to real transactions.

Government/Legislation

There is significant lack of adequate legislation that would legally regulate framework for conducting the electronic business. However, also important, there is lack of clearly defined supportive measures for the development of e-business. In addition, there is insufficient coordination of private sector, scientific and educational institutions to comprehend necessary measures to stimulate information on companies and easier access to Internet. Up to the some point, Croatia is the exception – needed legislation is mostly adopted and the state has done many steps in order to enhance the business environment.

The importance of legislation is very visible. For example, many companies have technology and e-business solutions, but the lack of legislation related to Electronic Signature is preventing them to start using it (for example, Macedonia and BiH). There are counter-examples – despite the lack of adequate legislation, many electronic shops in Moldova and Serbia are offering products and services with electronic payment. Business cannot wait for slow state reaction – it must expand or it will not survive.

2.8. E-EDUCATION

The basic facts on the elementary and secondary level of education show that the ratio of computers to pupils varies significantly from 20-30 in Croatia and BiH, to 90 in Montenegro or even more, perhaps 200 in Moldavia. The available data seems to be imprecise. Governmental structures mostly do not have clear statistics. Some of data is simply not available, or has been provided by ad hoc field researches that give only estimated values. In addition, even a good ratio of computers to pupils does not mean that computers are used in the teaching process (most of them are used for administrative purposes), or that existing computers are useful at all (there are many obsolete machines, even Intel 286/386 generation).

Therefore, the first conclusion is similar to that in many other sectors – we need better statistics and indicators to assess the real status. However, according to available data, it seems that all countries in the region need some kind of “Computer-for-all” programs for elementary and secondary schools. It is obvious that current way of purchasing the equipment partially is neither effective nor efficient (for example, during 1997-98, Moldova has equipped 821 schools with computer labs, but these labs have not been upgraded ever since – it means that they are not functional anymore). The most positive case of systematic way of equipping the schools is the Croatian Ministry of Education and Sport. Some other countries also have important initiatives related to schools equipping, such as E-School.mk initiative in Macedonia.

In terms of connection to Internet, only Croatia has relatively good position having all schools connected to Internet. That status shall be the standard for all the countries in the region. Probably the worst situation with the connectivity is on Kosovo where the most of the schools are not connected and it seems that Ministry of Education Science and Technology is not considering that issue as a priority at all.

The situation with academic and research networks is presented in the following table:

Country	NREN	Status	Operational external connections	Usable backbone capacity (Mbps x km)	Notes
Albania	Albanian Academic Network (ANA)	Governed by Ministry of Education and Science and the Academy of Sciences of Albania	– GRNET/ SEEREN (2 Mbps)	National backbone does not exist	– Many institutions are connected to private ISPs; – Serious improvement expected through SEEREN initiative
BiH	Academic and Research Network of Bosnia and Herzegovina - BiHARNET	It formally exists, although not accepted on the whole territory of BiH. Factually, NREN does not function.	– None	National backbone does not exist	– Since NREN does not function, institutions are connected to private ISPs; – Not included in SEEREN initiative
Croatia	Croatian Academic and Research Network (CARNet)	Fully funded by the Ministry of Science and Technology	– CIX (100 Mbps) – GEANT (1200 Mbps) – Commercial Internet (622 Mbps)	220,100	– Speed of connection ranges from 2 to 622 Mbps – All higher education institutions connected to NREN
Macedonia	Macedonian Academic and Research Network (MARNet)	Indirectly financed by government - MARNet member institutions pay from their own sources for the internal connectivity to NOC	– Commercial Internet (1 Mbps)	National backbone does not exist	– Existing SEEREN project aiming the connection to GEANT between 2 and 34Mbps – Universities are connected to MARNet
Moldova	Research and Educational Network Association of Moldova (RENAM)	Independent legal entity, indirectly controlled by government – governance by the research and education community which in itself is (largely) government-funded	– GEANT (8 Mbps) – Commercial Internet (6 Mbps)	30	– Institutions mostly connected to NREN
SCG	Academic And Research Network of Serbia and Montenegro (AMREJ)	Currently organized as a special project funded by Ministry of Science, Technology and Development,	– GRNET/SEEREN (34 Mbps) – Commercial Internet (34 Mbps)	140,050	– All Universities in the country are connected to the Academic Network

Usage of computer equipment at the universities is not so bad if we look at the statistics. Many universities have enough computers, networking technologies, even highly sophisticated installations (such as implementation of National Grid for Learning in Croatia), but we need to ask some other questions, such as:

- What is the quality of the most of the equipment?
- Is the equipment concentrated in "elite" or "luckier" institutions, or it is distributed more evenly?
- How is it used?
- How is it integrated into research and educational processes?

Even preliminary analysis does not give very optimistic answers. For example, some technical faculties at the Tirana University are relatively well equipped, but the total number of computers (about 300) at a university that has more than 1,000 teachers clearly indicates serious lack of equipment. Another extreme example is the E-Net distance-learning center at the University of Sarajevo. It is one of the most sophisticated video-conferencing centers in the whole World Bank GDLN network, but the University of Sarajevo University cannot be qualified as a university with systematically developed distance learning; quite opposite, the most of the faculties are not using the equipment for any electronically enhanced teaching.

Integration of ICT and new ways of doing teaching and research is also important. Although being *conditio sine qua non*, the equipment itself cannot produce serious positive impact. Electronically enhanced learning, including distance learning, is not present in the education systems within the region. Existing programs related to big corporations (such as Cisco Academy and Microsoft Certified programs that are present in every country) are relatively successful, but not integrated into national education systems.

The most of the libraries in the region do not have sufficient ICT support. Modern library has new role in the society and new ways of functioning, and that cannot be achieved without serious ICT support. In addition to basic systems, shared cataloguing is probably the most important feature. One regional initiative must be mentioned in that context. The COBISS initiative²⁹ is the only regional initiative to provide librarians the functional shared cataloguing system. It includes Slovenia, BiH, Macedonia, and Serbia and Montenegro.

However, even though promising, COBISS is not very successful. On the contrary, it has made disappointing progress. There are several problems related to that. It seems that the most important issue is the result of unclear ownership with respect to COBISS software developed by the Institute for information sciences in Maribor, Slovenia. The software was developed at a time when Slovenia was the part of former Yugoslavia. All the republics of the former Yugoslavia financed its development.

A good example of development initiative in libraries can be found in Croatia. The Ministry of Science and Technology provides funding for the procurement of software and on-line databases for university libraries within the project Scientific Information System. The aim of the project is to create a common network integrating all higher education institutions, primary schools, secondary schools and public libraries using standardized computer equipment and software. However, advantage that Croatian libraries have, that makes this project feasible, but that other countries do not have, is the fact that all libraries are connected to the Internet through CARNet, Croatian NREN. This example illustrates one more time the importance and urgency of further NREN development in all countries in the region.

Education and ICT are not related only by usage of ICT in education process and education institutions. In the context information society, the education system must become a service to citizens. Living in the information society requires every citizen to have some of so far unknown skills. In such a society, the education system must provide to citizens something more than just basic literacy and traditional knowledge. Apart from introducing into curricula the new knowledge and skills related to ICT, citizens must acquire during their schooling, the education system must transform itself to provide continued supplementation of such skills and knowledge through the concept of life-long learning. Education system's task is to carry out continued promotion and dissemination of knowledge on the information

society in different ways and inform of the importance of this transformation for the overall society development.

In terms of having the education system as a new service for information society, the most of the countries in the region simply fail to achieve that objective: children finish elementary schools without acquiring basic digital literacy; curricula in high schools is not adopted for new skills needed etc. Changing that situation is obviously related not only to pure introduction of ICT to curricula, but to overall reform of education systems.

Countries in the region are having serious gap between needs and services that education system offers. Even basic legislation is sometimes missing, such as in Bosnia and Herzegovina. Some legislation, such as regulation related to electronic books, is missing in the most of the countries in the region.

Of course, the gap between needs and offered services is more visible from the perspective of those who need services. Field research in all countries shows that business sector is not happy with the qualifications that education system offers. This is important indicator, since business is usually the most sensitive sector when it comes to needs for changes.

2.9. E-HEALTH

In general, health information systems within the region are mostly outdated and paper based. Coordination is not present, and ICT is deployed in fragmented and duplicative way.

The most significant developments are:

- Albania - Institute of Public Health runs the "Alert" information system for infectious diseases, used to collect data through the country and provide statistics to Ministry of Public Health;
- BiH – Improved Health Care Finance Information System implemented in Health Care Funds (both in FBiH and RS) through a World Bank supported project;
- Croatia – Two pilot projects implemented (Primary Healthcare Information System and Integrated Hospital Information System);
- Macedonia - Integrated Medical Information Systems implemented in several institutions (Clinical Center Skopje, Medical Center Prilep, Policlinics Zelezara Skopje);
- Moldova - Center for Health Informational Resources by the University of Medicine and Pharmacy, and the Informational Center "INFOMEDICA" started the pioneering work related to e-health issues;
- SCG - Kosovo - Telemedicine Centre of Kosova has been established with the intention of providing consultation and connection between University Clinical Center in Prishtina and Regional Hospitals in Kosovo;
- SCG – Montenegro - Project Control of distribution and usage of medicines implemented in the state pharmacies;
- SCG – Serbia – Implementation of system for distribution and usage of medicines in Belgrade is in progress;

2.10. ICT INDUSTRY

The issue of ICT industry development is related to overall information society development. According to the experiences from many countries, it is much more efficient and quicker to develop many attributes of information society with parallel development of own ICT industry, as a separate production line of the total economy of a country, than to develop the IS with someone else's ICT industry. There are several benefits of this approach, in the social and economic sense. The society will have its own development and research, which provides the foundation of permanent development and advancement of the society and economy in future. Without the development of the ICT industry, the society would be destined to permanent dependence and hindrance of development.

Despite pessimistic indicators with respect to the SEE economy, the ICT industry is actually developing and spreading within the region – it is one of the drivers of the economic growth. The reason behind that lies in the fact that the ICT is not limited to only developed countries; instead, it represents global interest

and the interests of all in particular. Governments of almost all countries within the region are trying to design or have designed effective policies to facilitate the use of ICT with the aim of stimulating the economic growth.

The ICT industry is growing within the region. For example, the IT market in Macedonia has increased from 37 million USD in 2000 to more than 50 million USD in 2003. In Croatia, even though the number of ICT companies has not significantly increased between 1994 and 2002 (15.76%), the gross income of these companies has increased by 300%.

In addition, the segmentation is changing. Hardware sales still dominate, but software and services are taking larger share of market (Examples: Macedonia – software application share increased from 15% in 2000 to 36% in 2003; Moldova - the average growth of sales in software industry during the period 2001–2003 was of 50%).

However, it seems that governments do not recognize these potentials. There are resources (factories, companies) that have potential, but without serious governmental stimulation, that potential cannot be developed. Governments are very often without managerial resources and available, updated and accurate data. In addition, ICT industry of all SEE countries can hardly achieve significant progress without considerable financial injections from abroad and extra efforts in domestic financial market.

Within that context, the ICT industries in SEE countries are looking for help to increase:

- Ability of domestic companies (public and private ones) to participate in the assembly, installing and maintenance of hardware for domestic needs;
- Ability of local companies to participate in the production and delivery of software for domestic needs;
- Ability of domestic companies to participate in the production and delivery of hardware and software for the needs of exports;

2.11. IMPORTANT EVENTS IN NEAR FUTURE

Year/Quarter	Event	Country
2004/3	Approval of the national Policy, Strategy and Action Plan for Information Society Development	BiH
2004/3	The third mobile operator gets license	BiH
2004/3	A meeting of the representatives of foreign donor organizations present in Macedonia with the Committee of Information Technology of the Government of the Republic of Macedonia, in order to reach an agreement for commencement of the process of developing National ICT Strategy.	Macedonia
2004/3	International conference on Information Society organized by the Academy of Sciences of Moldova.	Moldova
2004/3	2nd mobile operator selected and awarded license	SCG - Kosovo
2004/4	First drafts of missing e-legislation ready for review and adoption	BiH
2004/4	Conference "Action Plan for Information Society Development in BiH: 2005-2010"	BiH
2004/4	National programme for the integration of the Republic of Croatia into the European Union	Croatia
2004/4	Information Technology Interfaces - ITI 2004	Croatia
2004/4	CASE 2004	Croatia
2004/4	Mipro 2004	Croatia
2004/4	International INFO 2004 Fair (with the Promotion of e-Government Services Involved).	Croatia
2004/4	Parliament will adopt a set of laws aimed to improve situation in the sector (Law on Electronic Document, Law on Digital Signature, etc.).	Moldova

2004/4	Kosovo Optic Ring Project phase 1 implementation completed (Sections: Prishtina- Gjilan; Gjilan- Ferizaj, and Mitrovica – Prishtina)	SCG - Kosovo
2004/4	National Strategy for Education adopted by the Ministry of Education, Science and Technology	SCG - Kosovo
2004/4	National ICT Strategy adopted by the Ministry of Telecomm and Communications, and the Ministry of Public Services	SCG - Kosovo
2004/4	Law on electronic signature adopted by the Assembly of Kosovo	SCG - Kosovo
2004/4	Law on e-Commerce adopted by the Assembly of Kosovo	SCG - Kosovo
2004/4	Ex-Libris ALEPH 500™ integrated library system implemented in National and University Library of Kosovo (NULK)	SCG - Kosovo
2004/4	11 th INFOFEST, Festival of Information Technology Achievements	SCG - Montenegro
2004/4	ADSL services commercially available.	SCG - Montenegro
2005/1	The Agency for Information Society operational	BiH
2005/3	European Commission's opinion (avis) on Croatia's application.	Croatia
2005/3	Law on Data protection drafted and adopted by the Assembly of Kosovo	SCG - Kosovo
2005/4	Missing e-legislation completed	BiH

2.12. BENCHMARKING

This report is proof that SEE countries have not developed benchmarking procedures in accordance with European standards and norms. The data sources used here are mainly already prepared assessment reports, official data from institutions, and research results of various marketing and research firms. An additional data source was the survey on ICT Status held during the course of this project (March-April 2004). None of these data sources will be systematically available in the long term.

Benchmarking activity in regards to the development of an Information Society following eEurope and eEurope+ practices has been identified as the key element necessary to help the integration of the SEE countries into the ongoing European processes, having in mind that benchmarking activity would have two main objectives:

- Systematic monitoring of information society development for each of SEE countries, and the region as a whole
- Monitoring the fulfillment of the commitments of the eSEE Agenda by the SEE countries

Since all of the SEE countries have already started toward an Information Society, it is quite clear that the introduction of some benchmarking system is becoming urgent.

There are many possible benchmarking systems, and there are various sets of indicators to consider. This report suggests that the set of indicators chosen should have certain qualities.

- They need to be based on the findings of national ICT strategies regarding the relevance of indicators.
- They need to be relevant for most of the countries in the region
- They need to be realistic, in the sense they can be implemented
- They need to be scalable, having the potential to be used to track progress on regional level

Sets of proposed indicators are based on SIBIS indicator sets, prepared by the University of Applied Sciences Solothurn Northwest Switzerland (FHSO) in the context of the IST-26276-SIBIS project ("SIBIS - Statistical Indicators Benchmarking the Information Society"). Even though SIBIS clearly states that the proposed indicators are more appropriate for developed countries, we concluded that many indicators are quite relevant for SEE countries.

Considered relevant for monitoring of...	Indicator
...The digital divide	Divide of users of <u>computers</u> per various groups.
	Divide of users of <u>Internet</u> per various groups.
	Divide of <u>home</u> users of <u>Internet</u> per various groups.
	Digital Divide Index (DIDIX). Calculated by SIBIS methodology.
...The overall development of information society.	Divide of users of <u>Internet</u> per various groups. Included only those that use Internet for more then 2 years.
	Divide of users of <u>Internet</u> per various groups. Included only those that use Internet for more then 6 hours per day.
	People that can find information on the Internet.
	Index of digital literacy.
...E-Education development	Participation of adults in ICT training.
	Compliance of curricula with EU standards (Bologna Declaration and ECTS).
	Usage of ICT in teaching.
	Share of schoolbooks providing additional CD-ROM content.
	Number of subjects supported by electronically enhanced learning
	Percentage of teachers using the Internet for non-computing teaching on a regular basis
... The usage of ICT in education	Number of computers per 100 pupils/students in primary / secondary / tertiary levels
	Number of networked computers per 100 pupils/students in primary / secondary / tertiary levels
	Hours of computer use per pupil per week
	Number of computers connected to Internet per 100 pupils/students in primary / secondary / tertiary levels
	Number of teachers that use e-mail
	Number of students that use e-mail
	Number of computers with high speed Internet connections per 100 pupils/students in primary / secondary / tertiary levels (high speed defined as ADSL, cable, satellite, and fixed-wireless, UMTS)
	Index of quality of computer equipment
	Number of schools that have multimedia cabinet
	Number of certified computer science teachers
	Number of universities connected, number of primary/secondary schools connected
	Percentage of libraries offering Internet access to the public
	International links of academic network

Considered relevant for monitoring of...	Indicator
... ICT specialist education	Number of Places and graduates in ICT related third level education
	Number of ICT specialists produced per year
	Number of publications in ICT related subjects by academic staff in international journals or at international conferences
	Number of specialized ICT vocational training courses delivered to ICT professionals and number of professional having completed such courses.
	Number of technical schools for ICT
	Number of registered training centers for ICT
...The development of more effective, transparent, responsive government and public services	Number of public service available on-line
	Level of understanding and usage of on-line public services by citizens and businesses
	Index of security of government information infrastructure
	Number of government web sites
	Number of web sites at regional or local authorities
	ICT spending of the government, share of ICT budget in the overall budget of the government
	Percentage of public procurement which can be carried out on-line
	Number of government employees having received ICT training
...Government as a promoter, legislator and implementer of information society.	Governmental bodies in charge of ICT policy and related issues
	Number of laws and regulations drafted and approved that are directly related to the information society, compared to European Union legislation
...Informatization of health care services	Number of public health or social services organizations equipped with information systems, and connected to the Internet
	Percentage of health professionals with Internet access
	Number of primary cares physicians (PCPs) with Internet access in consulting room or office
	Number of PCPs using the Internet to communicate with pharmacies, secondary care (administration, clinical), patients
	Use of different categories of web content by health professionals
	Number of professionals in the health and social services sectors having received ICT training
...Development of Locally Relevant Content and Applications	Number of web sites of museums, libraries, newspapers, journals in local language
	Number of local language web portals hosted in the country

Considered relevant for monitoring of...	Indicator
...Infrastructure development.	Penetration - fixed telephony
	Penetration - mobile telephony
	Penetration - Internet
	Penetration – CaTV
	Penetration - computer users
	Penetration – TV
	Wireless coverage of x% of the country
	Internet access costs
	Number of independent telecommunications operators
	Type and number of services offered
	Internet use per economic sector (public sector, academia, private sector, health, social services)
	Percentage of households with Internet access
	Divide per type of connection (Dial-up, ISDN, DSL, cable, satellite, fixed-wireless, UMTS)
	Numbers of secure Internet servers in the country
	Number of Public Internet Access Points (PIAP) per 1000 inhabitants
...Development of ICT industry	Number of SMEs in the ICT sector
	Number of companies founded per year producing hardware, software or services in the ICT sector
	Number of off-the-shelf software solutions/applications on local language
	Number of applications service providers
	ICT import divided by total import
	ICT export divided by total import
	Increase/decrease of ICT import
	Increase/decrease of ICT export
	Value added in ICT sector divided by value added in total business sector
	Employment in ICT sector
	Increase of production

Considered relevant for monitoring of...	Indicator
...Development of e-business	Number and proportion of businesses with computers
	Employment (level and share) in businesses with computers
	Number and proportion of businesses with access to the Internet
	Employment (level and share) of businesses with access to the Internet
	Number and proportion of businesses with web sites
	Number and proportion of businesses with plan to use the Internet
	Number and proportion of businesses offering B2C e-commerce
	Number of B2C transactions
	Types of payment protocols used
	Percentage of workforce with (at least) basic IT training
	Number of companies that participate in B2B electronic commerce
	Number of B2B transactions